

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

Claims

- 5 1. A planar antenna (30) comprising:
a plurality of antenna elements (33, 41, 49) po-
sitioned relative to each other in a predeter-
mined orientation, each of the plurality of an-
tenna elements (33, 41, 49) being selectively
10 electrically connectable to one or more of the
other antenna elements,
a plurality of switches (56, 57) electrically
connecting the plurality of antenna elements so
that closing one of the switches causes at least
15 two antenna elements to be electrically con-
nected,
an antenna array (30) defined by the plurality
of switches (56, 57) in combination with the
plurality of antenna elements (33, 41, 49),
20 characterized in that
the antenna elements (33, 41, 49) are positioned
on a planar substrate (31) in such a way that at
least two different lobes (70, 72) of the an-
tenna can be provided by activating different
25 antenna elements (33, 41, 49) by means of the
switches (56, 57) located on the antenna sub-
strate itself.
- 30 2. A planar antenna according to claim 1,
characterized in that
the plurality of antenna elements (33, 41, 49)
comprise patches (34, 36, 38, 40, 42, 44, 46,
48, 50) on the planar substrate (31).

3. A planar antenna according to claim 2,
characterized in that
the patches (34 ,36, 38, 40, 42, 44, 46, 48, 50)
comprise a central patch (50) which performs a
coupling function to a microwave circuitry, such
as a waveguide (10), a coaxial probe, via a
hole, a slot coupling or any other type of cou-
pling

4. A planar antenna according to claim 3,
characterized in that
all other patches (34 ,36, 38, 40, 42, 44, 46,
48) have a length which is optimized to make the
respective patch resonate at a central frequency
and a width which is adjusted to the impedance
and radiation power of the antenna.

5. A planar antenna according to claims 2 to 4,
characterized in that
it comprises a left, a central and a right an-
tenna element (33, 41, 49) each comprising three
patches (34 ,36, 38, 40, 42, 44, 46, 48, 50),
wherein the patches of each antenna element are
electrically connected by vertical lines (58,
60, 62) and the left and right antenna elements
(33, 41) respectively and the central antenna
element (49) are electrically connectable by
switches (56, 57).

6. A planar antenna according to any of the preced-
ing claims,
characterized in that

a waveguide (10) is provided for coupling to the planar antenna.

- 5 7. A planar antenna according to claim 6,
characterized in that
the waveguide (10) comprises a transition (18)
to the planar antenna which is terminated by a
waveguide flange (16).
- 10 8. A planar antenna according to claim 6 or 7,
characterized in that
the transition (18) comprises a "Doggy bone"
filter (20) which reduces spurious radiation at
harmonic frequencies.
- 15 9. A planar antenna according to claim 8,
characterized in that
the distance between the "Doggy bone" filter
(20) and the plane of the planar antenna (30) is
20 about a waveguide length when the waveguide (10)
is mounted on the surface of the planar antenna
(30).
- 25 10. A planar antenna according to any of the claims
6 to 9,
characterized in that
the waveguide (10) is enlarged in its larger di-
mension in order to ensure a constant electro-
magnetic field on its rear aperture and to pro-
30 vide impedance matching.
11. A planar antenna according to any of the claims
6 to 10,

characterized in that

the waveguide (10) comprises a rectangular aperture which is designed to provide enough energy to the central patch (50) and to ensure a good matching between the waveguide (10) and the planar antenna (30).

5

12. A planar antenna according to any of the preceding claims,

10

characterized in that

the switches are PIN diodes.

13. A planar antenna according to claim 12, characterized in that

15

a path is provided for a DC current to polarize the PIN diodes and formed to have no influence on the antenna radiation pattern.

14. A planar antenna according to any of the claims 2 to 13,

20

characterized in that

at least connection-pads (52,54) for applying DC current to the switches and/or a part of the control lines (66,68) are covered by a material absorbing microwaves.

25

15. A planar antenna according to any of the preceding claims,

characterized by

30

a circuitry for controlling the planar antenna (30) by obtaining at least one Doppler Signal from at least one measurement device (100, 102) working with at least one lobe of the planar an-

tenna (30), processing the obtained Doppler Signals according to an algorithm and performing a high-speed switching between the configurations of the planar antenna (30) in accordance to the algorithm.

5

16. A planar antenna according to claim 15, characterized in that the circuitry comprises sample and hold circuits (114, 116, 118, 120) for sampling the obtained Doppler Signals.

10

17. A planar antenna according to claim 16, characterized in that the sample and hold circuits (114, 116, 118, 120) are synchronized with the high-speed switching.

15

18. A planar antenna according to any of the claims 15 to 17, characterized in that the circuitry comprises a digital signal processor for processing the at least one Doppler Signal.

20

25

19. A planar antenna according to claim 18, characterized in that the digital signal processor processes two Doppler signals obtained from two measurement devices (100, 102) and corresponding to two different lobes of the planar antenna and calculates from the Doppler signals an intermediate lobe by weighting the Doppler signals.

30

20. A planar antenna according to any of the claims
15 to 19,
characterized in that
5 the circuitry comprises an oscillator (108)
which produces a sampling frequency signal (Φ)
with an accuracy suitable for sampling.
21. A planar antenna according to any of the claims
10 15 to 20,
characterized in that
the circuitry is formed to perform sampling by
pulse width modulation.
- 15 22. A planar antenna according to any of the preced-
ing claims,
characterized in that
it is used in a Door opener sensor (152).
- 20 23. Device using a planar antenna according to any
one of the claims 1 to 22, characterized in that
the Door opener sensor (152) performs a parallel
traffic rejection algorithm which processes the
information received from the planar antenna in
25 such a way that at least two different lobes
(154, 156) of the planar antenna are analyzed in
order to calculate the direction of a pedestrian
moving in or near to the area covered by the
Door opener sensor (152).

30